

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

APR. 10, 1950



L-M's line of lights



*brings 'em in
safely!*

All over the world, L-M runway lights are bringing pilots in to safe landings—in all kinds of weather. For L-M lights more runways than do all other high intensity systems combined. L-M's complete line of runway lights fits all airports—from the smallest to the largest. For complete information ask the L-M Field Engineer or Airport Lighting Division, Line Material Company, East Stroudsburg, Pennsylvania. (Line Material is a McGraw Electric Company division.)



Above, left to right: L-M's famous extreme high intensity unit—180,000 cp with controllable beam; new fixed focus bi-directional high intensity unit; approved under CAA specifications L-818 and 819, respectively. Medium intensity unit for secondary runways, taxiways, and smaller airports.



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YOU CAN BE SURE... IF IT'S
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These leading U. S. Navy

SHIPBOARD FIGHTERS

are **POWERED** by Westinghouse

All twin engine fighters for the Navy's newest carrier-based jet squadrons are powered by the J-34. This light and slim Westinghouse engine lends itself easily to a twin engine installation which in turn provides the outstanding safety factor of single engine operation in times of emergency.

The designers of these airplanes chose the J-34 because it combines high power with low weight. These features plus the power, dependability and performance of the engine assure that the air striking force of the United States Navy will be second to none.

254002 B

Westinghouse
AVIATION
GAS TURBINES



**Now DC-4 operators, too, can
cut brake maintenance costs**

THE AIRLINES that have switched their DC-4s to B. F. Goodrich brakes have made important reductions in maintenance costs. TWA reports substantial savings on its Stratoliner brake maintenance when making the switch. Now DC-4 operators can do the same!

The CAA has approved B. F. Goodrich brakes for the DC-4, following tests also run by Capital Airlines.

Simple design is the reason behind the low upkeep of B. F. Goodrich Freyender Tube brakes. Many of the extra parts and linkages found in other brakes are eliminated. A screwdriver and

wrench are the only tools needed for releasing. Full-circle linkage arms and low pressure operation make for slower, more even wear. New, patented brake blocks that use no rivets permit use of all the lining. As a result, maintenance men insure "hygiene" in brakes and replacement costs are all cut!

What's more, pilots report they like the "operational feel". This brake can now lock or grab. It responds smoothly to maximum pressure. It takes emergency conditions easily.

The B. F. Goodrich brake also saves weight. It can be designed lighter for

a given amount of kinetic energy than any other brake.

Here are a few of the planes that are enjoying these benefits of the BFG wheel and brake assembly: Stratoliners, B-36, Constellation, B-47, Navion, C-124, B-45, PVN, F-84, converted DC-3s, converted Stratoliners. Put your DC-4s under good company. The B. F. Goodrich Company, Automotive Div., Akron, O.

B.F. Goodrich
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Providing P-T Air Service, Inc., Hays, Kansas, operates 58 planes and a fleet of tank trucks for confining sage and spraying weeds throughout a 10-acre area, guarantees 50% kill of all susceptible weeds. Results in greater crop yields and increased protection for such are impressive. P-T Air Service also operates a Ryan Navion Charter Service and is Navion dealer for western Kansas. All P-T planes are lubricated and fueled exclusively with Texaco and a special Texaco oil is used as base oil for the 2, 4-D spray.



**P-T Air Service sprays
million acres annually...
relies on Texaco for
dependable operation
of its 58 planes**

Says Don E. Pratt, President of P-T Air Service, Inc.: "We have used Texaco products exclusively for years. Principal reasons in their always uniform, always dependable high quality. It means trouble-free performance and lower maintenance costs for us. And Texaco Lubrication Engineering Service has been extremely helpful."

These benefits explain why Texaco is so widely preferred everywhere in aviation.



as shown, for example, by the fact that—
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Make your first step towards simpler lubrication and maintenance procedures... increased efficiency and reduced costs... by calling in a Texaco Aviation Representative just contact the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

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FOR THE AVIATION INDUSTRY

TEXACO STAR TRAVEL presents MATCH MADE in aviation every Tuesday night. Catch your local newspaper for time and station.

NEWS SIDELIGHTS

Pisceski Advertising Sequel

Since Pisceski Helicopter Corp. Marine, Pa., advertised for help wanted in *Shoney Aircraft's* hometown newspaper, the *Redemptor, Conn.*, Post (Aviation Week March 6) there have been new developments.

• Pisceski management apologized to the United Aircraft Corp. management for the advertisement the day when it appeared.

• Similar apologies were promptly made by Pisceski management to Bell Aircraft and McDonnell Aircraft for similar ads placed in Buffalo and St. Louis papers.

The ad was headed "Pisceski Wants Agents" and called for experienced engineering personnel to "advance with the service," seeking in selection of Pisceski's H-21 as well as a USAF Arctic rescue helicopter competition in which all four helicopter manufacturers entered.

Aviation Week has learned that the Pisceski proposal for its model PD-22 (H-21) which used a Wright R-1520-76A engine rated at 1000 hp (most powerful engine specified in the competition) was judged the only entry that fully met technical requirements.

At National Commercial Industries received data submitted by the competing companies after which a 10-man steering committee (two pilots and three maintenance specialists) started. Each plant in candidate a prototype in flight test. Their evaluation was further received by the USAF Transport Helicopter Board at Wright Field which recommended the H-21, procurement in December. Six weeks later, after further review at the Pentagon, the award was made to Pisceski.

Last week detailed negotiations leading to signing of the aircraft contract for the H-21 were virtually completed and signing was expected "next day" or so.

More Sauces

Pisceski officials were up to their ears in rumors again last week—per subject flying saucer stories.

The fabulous discs are everywhere, so the stories went.

That story was the story which broke in David Lawrence's weekly, U. S. News and World Report. Typical of Lawrence's staunch Navy support, the story said the discs were printed actually developed by the Navy. Details were included 115 ft diameter,

Scratch the War Babies

After four years of stretching the war years, surplus fighters at World War II into lighter speeds at the National Air Races at Cleveland every Labor Day, the Air Race management has called a halt in the interest of safety. There will be no high-speed pursuit engine, fighter Thompson planes over five years old, nor will the piston engine fighters be in competition race for one.

Competition on Sept. 2-4 will be confined to USAF and Navy jet fighter events (jets will average 3,000 mph), and to study of place: closed-course racing, with possible new emphasis on a state show of aircraft and equipment. Jets will compete on a 100-ft-diameter course to be set up over open country with emphasis on safety for pilots and spectators. A jet division at the Bendix will also be run from the West Coast.

A new sponsor for the major event, to be named shortly, may be Thompson products. Good news, which sponsored the major event under a five-year contract without a completion of that contract. A possible additional event either this year or next may be another racing competition for planes larger than the fighters, probably of 1940 to 1945 in displacement as compared to the 1940 as displacement of the fighters.

10 ft diameter, jet engines visible in direction for control.

No other has that they got out than Henry J. Taylor, radio commentator, stated just as unexpectedly that the flying saucer are secret development of the "Army Air Force."

At President Truman's request Defense Secretary Johnson stated:

"There is no intention of exposing Project Saucer, an Air Force secret project closed three months ago (to retransmit the program). However, announced as an defense in an Air Force responsibility, USAF has continued and will continue to receive and evaluate any unusual aerial phenomena. None of the three services or any other agency of the Department of Defense

is conducting experiments, classified or otherwise, with disclosed flying objects which could be a basis for the reported phenomena. It is particularly requested there has been no evidence that the phenomena are attributable to the activity of a foreign nation."

Aviation Week last week learned that the early USAF acceptance report received by Project Saucer, but discarded for lack of sufficient corroborating evidence, indicated that the "saucers" may be of Russian origin.

Meanwhile U. S. News and World Report stated with its story inserted it could reveal its sources of information.

Air Field Survey

Air Force has assigned to Continental Air Command the task of surveying airfields throughout the nation for air facilities as operational bases for jet fighters and bombers in event of war.

First task been set up at March Air Force Base, N. Y., a complex of an area from Air Force aircraft. The men are to determine which fields in the Zone of Defense area of New York have facilities to handle the next jet combat aircraft.

These findings and experience will be used for similar studies throughout U. S. by similar means.

Who Wags What?

House Armed Services Committee's Chairman Carl Vinson (D., Ga.) has stepped cautiously in an attempt to determine Secretary Louis Johnson and his role of the department, arbitrary reorganization of funds and "purge" of subordinates.

In his speech last week, saying a \$285 million in the defense budget for aircraft procurement, Vinson put it bluntly: "The issue is clear out: Is it whether the Congress will say what kind of defense the nation will have, or whether the creation of the Congress, the Secretary of Defense, Mr. Louis Johnson, will tell us what kind of defense he will let the Congress have."

Harmony at Commerce

Some government agencies under the post that never before have GSA and C&I worked together so harmoniously as at recent months. Why? Davis, Reuter and O'Connor have been setting the pace for staff agencies on the working level.

The New COMPACT ELECTRIC ROTARY ACTUATOR



Trim Tool

The new TRIM TOOL is now greatly reduced in size and weight without sacrificing capacity or performance. Developed from the original models, which have enjoyed wide acceptance, these new units are available with the two mounting arrangements (illustrated).

- **Static Capacity—1800 inch pounds, min.**
- **Operating Load Capacity—350 in. lbs. (960 Revs)**
- **Positive Transmitter or Potentiometer Both in.**
- **Compliance with all applicable specifications.**



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AVIATION CALENDAR

Apr. 12—American Society of Mechanical Engineers, Aviation and Gas Institute in session, Hotel Statler, Washington, D. C.
Apr. 16-20—National Bureau of Standards, 1001 Ave. of the Americas, New York, N.Y.

Apr. 17-20-1950—National Scientific meeting, Society of Automotive Engineers, Hotel Statler, New York, N.Y.

Apr. 18—Meeting of the Institute of Aeronautics of the United States, Hotel Statler, New York, N.Y.

Apr. 27-28—Air traffic conference, sponsored by the Traffic Conference of the National Aeronautics Association, Hotel Statler, New York, N.Y.

Apr. 28-30—10th annual conference on stress and expansion, Jacksonville, Fla.

May 3-6—15th National Aviation Standards Committee annual meeting, Aircraft Industries Association, Los Angeles, Calif.

May 12-15—Vibration conference on fluid dynamics and meeting of American Physical Society, Hotel Statler, New York, N.Y.

May 14-15—Annual meeting and field annual town of Corporation America, Hotel Statler, New York, N.Y.

May 19-20—Aircraft annual general assembly meeting, sponsored by Institute of Aeronautical Sciences, Hotel Statler, New York, N.Y.

May 24-26—Technical conference on the meeting sponsored by American Institute of Aeronautical Engineers and National Technical Association, Hotel Statler, New York, N.Y.

May 27-28—Aircraft Industries Association annual meeting, sponsored by American Institute of Aeronautical Engineers and National Technical Association, Hotel Statler, New York, N.Y.

May 31—Annual meeting of the American Institute of Aeronautical Engineers and National Technical Association, Hotel Statler, New York, N.Y.

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NEWS DIGEST

DOMESTIC

Shipment of 235 one-to-two place personal and executive planes will be made in June compared with 175 in 1949. Included were 130 four-engine planes, and 50 one- and two-place units, with total net selling price of \$1,775,000. Companies reporting to Aircraft Industry Association were: Aerojets (17 planes), Beech (28), Bellanca (2), Cessna (55), Mooney (1), Piper (144), Ryan (7), Taylorcraft (2), TBMCO (5). Shipments by eight manufacturers in January totaled 172, valued at \$944,980.

Military and civil aircraft deposits for January totaled 3,985,000 lb. Civil planes amounted 305, valued at \$12 million. Military accounted for 74 percent in value and weight. Total annual engine hp was 4,121,893, with military accounting for 97 percent. Employment in aircraft plants was 165,511, against 161,145 for previous month. Engine plant employment for January was 39,847, compared with 39,984 for December.

Charles "Chief" Klötter, president of the president, Glendale Aircraft Co., said weekly known engine overhaul capacity, filed in Glendale, Calif. He was 92 years old.

Norfolk-Fort Authority agreement to use New York International (Idlewild) Airport was put in question by action of New Jersey legislature in failing to act on bill that would enable Authority to assume to act. Agreement between airport and Authority, last fall was partly conditional on later passage by the legislature of New York and New Jersey of bills to change the Authority's status regarding land ownership. New York passed the measure, but the New Jersey legislature did not put it on the "floor" but as a "housekeeping" measure.

CAIR and CAA heads O'Connell and Bushnell have asked 15 principal aviation organizations to participate in a meeting in Oklahoma City May 5-6 to discuss preliminary plans for a new national program in aviation safety acceptance and use of aviation. Chief object of meeting: To obtain agreement of all organizations to hold annual meetings simultaneously with a national aviation conference.

Vice Adm. Rende McCannick left work week, turned up, chief of Naval Operations. He returns Vice Adm. John D. Price who has been elevated Chief of Naval Training, Pensacola, Fla. McCannick is a submarine expert. Navy now has an aviation expert (Chief of Naval Operations

Shornoff) and a submarine navy expert (Vice Adm. Rende).

Gen. Gilbert R. Linton, minister of Defense of Mexico, will arrive in this country late this month, at perhaps to seek U. S. aid in purchase of single-engine trainer and fly boat aircraft for border-patrol use of several jet fighters for Mexican Air Force.

History of aviation is to be prominently featured at World Transportation Fair to be held at Santa Anita Park, Los Angeles, May 30-September 1, 1951. Foreign and domestic exhibits are being sought to control new models with those of aircraft vintage, with criteria that to be awarded for select exhibits.

Air express service between all cities in the U. S. and elsewhere is to be re-organized May 1 by Northwest Airlines and Eastern Express Agency. Shuttle routes are scheduled to include destinations New York in 20 min. from Minneapolis in 15 min., and Seattle-Toronto in 8 hr.

Justice Dept. has voted a General Motors proposal to buy government's wartime popliteal plant at Saginaw, Mich., stating that the deal would be contrary to the purpose of the anti-trust law.

FINANCIAL

Stewart-Warner Corp. reports net profit for last month, Dec. 31, 1949, was \$2,163,180 on sales of \$34,000, 713, compared with 1948 profit of \$1,154,125 on sales of \$27,574,085.

Northrup Aircraft, Inc. reports net profit for last month, Dec. 31, 1949, of \$890,555. Company's annual operating loss was \$888,795 for 31 ending was \$54 million.

INTERNATIONAL

Charles Skoppy long-range British general plane (Aviation Week, Dec. 12, 1949) has been ordered to be ordered under the Uruguay and Brazil, prior to completion of such a Certificate of Airworthiness from Skoppy will be about \$5,000.

Four Gloster E-100 planes were scheduled to be, tested by Netherland general plane, under the Channel from Britain for delivery to Britain in Belgium and Denmark. Operations was scheduled to take about one week, and total mileage to be flown by the E-100s at approximately 4,000 mi.

Russia and China have agreed a ten-year agreement for a jointly owned aircraft to operate between Beijing and Russian cities in Siberia.



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of faster planes**

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WHO'S WHERE

In the Front Office

Oliver Mulvey has been appointed vice manager for Pan American's Atlantic division with his office at LaGuardia. Joining PAA in 1941, he played a leading role in developing the airline's present South Pacific operations, his latest mission being a transoceanic flight to Hong Kong to strengthen our position created by the Clinton test.

Mr. Mulvey has been named head of Eastern Air Lines' public and sales and will have in his assistant William T. Raymond, who came to the airline from Air Transport Association. First named EAL in 1947 as vice president in the Air Force, when he received Legion of Merit for services during preparation for its seizure of France. Raymond had been with ATA for seven years. When he left he was director of government affairs.

Otto E. Kuehner has been promoted to director of operations training for American Airlines and will serve as coordinator of AAL's aircraft operations and performance personnel in relationship with government agencies. Formerly director of engineering at TWA, he joined the airline in 1935.

Thomas E. "Tom" Piper has been made vice president manager of Piper Aircraft Corp., which was founded in 1936 after graduating from Harvard. He has held various manufacturing, design, experimental, test flying and sales executive positions, and has helped improve the Field Artillery Flight School at Fort Meade in 1942.

W. C. Fittell has been appointed sales manager of American Aircraft Corp.'s aircraft division, according to Walter R. Seib, who has left the company to become sales manager of aircraft division of Lowie Inc.

Changes

Roger Lewis, graduate for Canadian, Ltd., since 1945, has resigned to take another position.

John Eber has been assigned head of sales order and operations department for Duxbury Aircraft Service and will be assisted by William Anderson, an American, joint sales manager for Western Air Lines since 1946, has stepped to firm his own sales organization, concentrating on western markets.

Robert G. Gossall and Richard Lorsch have been designated as B-47 Skyraider test pilots by Boeing Aircraft Co. Howard R. Speer and T. H. Hall have been promoted to vice president, respectively, of Champion Spark Plug Co.

Honors and Elections

Frederic B. Corbridge, of the flight research division of NACA's Langley Aeronautical Laboratory, has received American Helicopter Society's annual award for "outstanding achievement in the field of helicopter engineering, including research and theory." He joined NACA in 1945 and is a member of the subcommittee on helicopters and author of a number of technical reports on rotor design.

INDUSTRY OBSERVER

(This week's column is devoted to the observations of an American Western editor who covers the aerial scene of the American Helicopter Society in Philadelphia.)

► New anti-submarine warfare requirements for improved helicopter stability have resulted in sending the Paveco HRP-1 helicopters, recently delivered to Patuxent Naval Air Station, back to an interim plant at Martins, Pa., for an experimental set of ten similar to those used on the older HRP-1. Without the added fin, the HRP-1 was described as having equal stability to that of the HRP-1 with fin. Paveco's tender HRP-1 is also being tested with additional fin area for more critical stability.

► Don't overlook Bell Aircraft's chances in the off-the-shelf anti-submarine warfare helicopter competition. Bell is just finishing up 11 of its RH-42 amphibious helicopters for the USAF, and would like to make some for the Navy as well for off-the-shelf ASW.

► If U. S. Marine Corps is planning to replace liaison planes with small helicopters in its VMHO squadrons with such Marine divisions, buyers of the somewhat flexible and maneuverable of the small helicopters, thereby saving another round for rotary aircraft in the service losses, possibly which has been going on since previous days of the airplane and the German Fieseler Storch airplane.

► United Helicopters has taken the government lot with the tender service by sale of one off-the-shelf Hiller 360 to the Navy for evaluation purposes.

► Full-size powerplants on the Jay Sargent XAS helicopter are at a frequency of 100 explosions per minute. American Helicopters expects to have the experimental prototype developed sufficiently for partial USAF use in another year.

► Helicopters powered with jets is expected to be the next development of Helicopters. What Coast Airlines, who add the foreign rights to its original engine helicopter to an English group, Helicopters, Ltd., recently.

► Bell Aircraft has obtained CAA approval of its new dual landing gear for the Model 47 helicopter, which characterizes dual wheels, dual and twin. The dual gear is designed for quick adaptation to finish it required. Considerably lighter than conventional wheel gear, the dual gear makes possible variable clearance in payload of the Model 47.

► Success of Paveco's in the tandem rotor helicopter competition is being followed by other companies. Bell is making a tandem rotor investigation for the anti-submarine warfare competition, while Sikorsky is reported to have made some tandem configuration design studies, but has not, as far as is known, started a machine.

► Jet helicopter experiments are being closely watched by the entire helicopter industry. If the jet pilots are successfully adapted to helicopters, they will eliminate torque, one of the primary engineering problems in helicopter design. Possibility that Paveco may get into the jet rotor field is indicated in the recent acquisition by Laurence Becker, seller of controlling interest in Maryland Aircraft Co., major engine maker. Becker is also a principal stockholder in Paveco.

► Initial flight operations with Sikorsky S-48 helicopter have shown the machines capable of satisfactory instrument flight operations with standard attitude instruments, at speeds above 40 mph., and have brought about government approval of the IFR operation of the machines under limitations of 1-mile visibility and 500-ft. ceiling.



New 'Foot-Print' for B-36

NEARLY USARF-sponsored development of track landing gear designed to spread the weight of an airplane over a greater "footprint" area as a means to the largest jet developed—on mobile form in the Convair X-24-16 now being tested at Ft. Worth in preparation for first track flight tests soon. (Use of track gear for the B-36 and for the long, paratrooper-controlled, the XC-99, now located in AMERICAN WEEK, July 5, 1949.)

The B-36 track gear was designed by Convair and fabricated at Ft. Worth, with the exception of the main gear bogie track drive, made by Cleveland Pneumatic Tool Co., the track belts and rollers, made by Goodrich, and the new gear bogie, track drive made by the Karl Douglas Co., Los Angeles.

Essentially similar in action, similar track gear, developed in a continuing USARF program, the B-36 development uses two endless belts on each gear. Each of the belts on the main gear is 16 in. wide, 27½ in. in circumference and has a thickness of one inch, except for a three-inch drive belt in the center. This wedge acts as a dot in the bogie rollers which center the belt.

Belts are roller-mounted with brass

plated steel cables, and are held to maintain a gull of 150,000 lb. Bogie wheels make the track belt are made of a two-magnitude roller construction. In motion, between 180 lateral roller bearings, weighing approximately 500 lb. are used.

Advantage of spreading the 150,000 lb. (gross weight) of the B-36 over a greater landing gear area, was followed by Convair engineers, who replaced the original bogie wheels with 16 main gear, with quadruple wheel gear. The track gear bogie corrects the idea which earlier, with a track, that the main gear tracks show a maximum average pressure of 57 lb. per sq. in. compared to 150 lb. per sq. in. for the quadruple wheel gear the track.

The Boeing B-50 track gear installation, too, tested successfully last year, was the installation was smaller than the B-36 gear. First rollers large plane to use transfer gear was a Fairchild C-82

Pfister (AMERICAN WEEK, July 5, 1949) experimental tests conducted at Wright Field during World War II involved use of small track gear on such planes as a Douglas A-24 attack bomber, Curtiss P-40 fighter, and Lockheed P-38.

An AMERICAN WEEK model 11 G-1000, CAA engineer at San Diego, has recalled that probably the critical track gear installation was the March Vero gas turbine No. 12, 1938 and back as a General Electric engine plane. Another jet World War II in solution was the British De Havilland Comet, which was a Lockheed L-1049 and from which some of the subsequent American gear derived.

SEC Reports Stock Sales

Purchase of 17,000 shares of Consolidated Value Aircraft Corp. common stock, with a market value approximately \$190,000, by LaVerne L. Collins, president, is reported in Security and Exchange Commission's recent review of major transactions.

The La Collins' total present holding is 41,000 shares.

Other aviation transactions reported for the last January to and February period were:

- **ANCO Manufacturing Corp.** Sale of 800 common shares by C. Graham Downing, director, leaving a holding of 10,000 shares, sale of 1000 common shares by Raymond Powell, director, leaving a holding of 77,420 shares.

- **Capital Airlines** Purchase of 1700 common shares by Charles Matthews, director, making a total holding of 4700 shares.

- **Consolidated Value Aircraft Corp.** Purchase of 2500 common shares by each of the following: Robert Bink, officer, total holding, 1 W. Miller, officer, making a total holding of 2900 shares; William Reichlefsky, director, making a total holding of 1800 shares; V. C. Schweinhart, officer, making a total holding of 2345; Raymond Schold, officer, making a total holding of 1213 shares.

- **Lockheed Aircraft Corp.** Sale of 652 capital shares by Charles Barker, Jr., leaving a holding of 484 shares.

- **Northrop Aircraft, Inc.** Purchase of 1700 common shares by Oliver Kahle, director, total holding.

- **Solar Aircraft Corp.** Sale of 400 common shares, total holding, by Laurence Kinsler, director, sale of 200 common shares by Herbert Kinsler, officer, leaving a holding of 100 shares, sale of 180 common shares by Joseph Padgett, director, leaving a holding of 1800 shares.

- **United Air Lines.** Purchase of 1000 common shares by William Peterson, president, making a total holding of 5550 shares; purchase of 500 shares by Carroll Hearnsham, officer, making a holding of 901 shares; purchase of 2000 shares by Harold Gray, officer, making a holding of 7250 shares; purchase of 2000 shares by John Hartley, director, making a holding of 2968 shares; purchase of 1000 shares by Donald Major, officer, making a holding of 1840 shares; purchase of 693 shares by Sam and Morris officer, making a holding of 878 shares.

Capital stock holdings of officers and directors of Pan American World Airways were reported, as follows:

- Charles Adams, director, 489 shares;
- Ernest Boller, officer, 15,711 shares;
- Francis Baily, director, 150 shares;
- Howard Dean, director, 7008 shares;
- S. M. Fanchard, director, 20,750 shares;
- Robert Ferguson, officer, 370 shares;
- Henry Friendly, director, 2470 shares;
- Franklin Glendon, director, 3152 shares;
- Harold E. Gray, officer, 945 shares;
- Robert Hagler, director, 1144 shares;
- Robert Lohman, director, 200 shares;
- John Lister, officer, 551 shares;
- Walter Lippincott, officer, 1605 shares;
- Edward McDonald, director, 100 shares;
- H. Preston Morris, officer, 1456 shares;
- William Newman, officer, 100 shares;
- Arthur O'Brien, officer, 4151 shares;
- William Payson, director, 4098 shares;
- William Shedd, director, 100 shares;
- Vernon Taiter, director, 2000 shares;
- J. H. Towner, officer, 215 shares;
- John Triggs, president, 90,019 shares, plus control of 20,000 shares in British John Woodbridge, officer, 1163 shares.

Aviation transactions reported for the period from last December to mid-January were:

- **Stratell Airways.** Sale of 1200 common shares by T. E. Ruffell, president, making his holdings to 279,224 common shares.

- **Capital Airlines.** Sale of 2400 common shares by George Hane, director, reducing holdings to 5100 shares; purchase of 100 common shares by Janet Aspre, officer, total holding.

- **Consolidated Value Aircraft Corp.** Purchase of 800 common shares by Karl Bink, director, making a total holding of 1500 shares; purchase of 500 capital shares by Fran-

Air Force Contracts

Charles Wright Propeller Co., Corbin, Wyo., Corp., Caldwell, N. J., or as called as Air Force contract holding \$116,579 for installation and operation of propeller units on soft-power gear for C-54 and C-55 bombers. Contract date is Jan. 5, 1949.

Other recent contracts in amount of \$105,000 include:

- **Shenck Instrument Corp., Lansing, Mich.** B-1 sub-contract, Feb. 11, 1948, \$25,000.
- **AC Spark Plug div., General Motors Corp., Flint, Mich.** Unit test, field on testing and test handbook data, Jan. 16, 1948, \$17,500; AC 111 spark plugs, Feb. 15, 1948, \$15,000.

- **Air Equipment Co., Oakland, Calif.** Under test engine unit, spare parts and data, Jan. 27, 1948, \$17,500.
- **Airley Cramer & Instrument Corp., N. Y. N. Y.** contract and inspection, Jan. 13, 1948, \$12,000.

- **American Cold & Welding Co., Inc., N. Y. N. Y.** purchase contract, Jan. 18, 1948, \$10,000.
- **Boyd, MacIntyre, Conn.** Motor club engine purchase, Jan. 18, 1948, \$10,000; \$17,000, \$95,000.

- **Coast Instrument Co., Los Angeles, Calif.** engine purchase, \$15,000, Feb. 9, 1948, \$15,000.

- **Curtis-Wright Corp., Columbus, Ohio.** modification of B-19 engine, Jan. 22, 1948, \$10,000.

- **Dresser Chemical Co., Baltimore, Md.** engineering report, grade A, Feb. 12, 1948, \$10,000.

- **De Vries Co., Toledo, Ohio.** test, post-test, first type tests, and maintenance, Feb. 11, 1948, \$10,000.

- **Edgemoor Power Co., Detroit, Mich.** Airplane, Feb. 11, 1948, \$10,000.

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engineers spare parts and data, Feb. 17, 1948, \$10,000.

- **Consolidated Value Aircraft Corp.** Purchase of 100 common shares by LaVerne L. Collins, president, making a total holding of 10,000 shares.

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Woodbridge, making a total holding of 1163 shares.

- **Sole Aircraft.** Sale of 200 common shares by Alexander Black, director, leaving a holding of 59 shares, sale of 500 common shares by Jack Ochs, leaving a holding of 369 shares.

New officers and directors reported holdings, as follows:

- **Buch Aircraft Corp.** Dwight Wallace, 150 shares.
- **Brenda Aviation Corp.** C. S. Harding Mott, an indirect interest through 14,300 shares held by the C. S. Mott Foundation.
- **Capital Alliance.** Crawford Johnson, 100 shares.
- **Northrup Aircraft.** William Willett, no holdings.

ACC Transport Plan Chances Seen Dim

A revised Air Coordinating Committee transport prototype testing program selling for government expenditure of \$12 million in five years, is being sent back to the Bureau of the Budget, as probably the last attempt in this session of Congress to get any kind of federal financing for new transport aircraft. Chances for outright government financing of prototype development, reported almost hopeless in the present Congress state of mind.

Two congressional highlights were:

- **Sen. Edwin Johnson (D., Colo.),** Chairman of the Senate Interstate and Foreign Commerce Committee, wrote off possibility for a prototype program. "All advanced factors are sticking to their own little corner, there is no indication that they can be brought together to sponsor a program, and until they are, it would be futile for Congress to try to solve the matter," he told AVIATION WEEK.

- **The revised program under which** the Department of Commerce would finance light testing costs on new transport types, drawn up by the ACC, was set for submission to the Bureau of the Budget.

Program had the backing of various ACC representatives—Civil Aeronautics Administration, Civil Aeronautics Board, National Advisory Committee for Aeronautics and the approval of the Department of Defense. It would authorize a \$12 million expenditure over five years, but this amount may be scaled down. The original ACC testing proposal (November, Winter '60), following the Air Force to finance a \$12-17 million program, was objected to by the Budget Bureau. USAF was unwilling to underwrite the program, it is understood.

ACC proposal would finance service testing on two prototypes: a turboprop transport and a turboshaft transport

Parasitically the turboprop transport would be the Conquest class in a proposed Martin turboprop plane. None of the transport aircraft companies have submitted to having turboprop transports under construction although reports persist that Lockheed has one just drawing board stage.

In recent testimony before the Commerce sub-committee of the House Appropriations Committee, CAA Adm. William Del Ratzon reported:

"We will have to do something to break the log jam and get some development on this field so we can get each (jet) transport, whether turboprop or a jet propeller configuration does not make too much difference as long as we get them."

"The national defense people do not anticipate an immediate need for any jet transport type. Because of this cargo life they are content with piston-engine type."

However I believe the door is open for a qualified program to be undertaken by industry and government jointly.

Basic argument among prototype development advocates is whether program should be directed at:

- **Solving the Department of Defense's** acute deficiency in the military requirement estimated for M'Day. The world aerial development at advanced, but conventional, long-range cargo and transport types, suited to military utilization. Emphasis would be on increasing the existing airlift capacity and meeting specific requirements to fill specific existing M'Day, or
- **Assessing U. S. Leadership** in conventional aviation through the development of an advanced jet transport type.

See Johnson favors the first pro-

gram, but is cool to the second. It is a national issue more important to fill the gap between the airlift capacity and requirement than to promote commercial jet developments," he declared. The Department of Defense concurred. When Budget Bureau turned down USAF's program to construct two low-cost, long-range cargo or transport aircraft (AVIATION WEEK Feb. 6), the department announced that it would approve "any other bill which provides for prototype development at government expense."

The department has accepted the Budget Bureau's rejection and is not pushing its own program. On the issue of joint check of Staff finding that a bill was at least two to three years away, the department's consent to postpone solving its airlift deficiency.

The Air transport industry, on the other hand, has thrown its weight behind a program to meet the challenge of British advances in the commercial jet field. Air Transport Association told the Defense Department's program because it would pose the luxury problem of obtaining a vastly expanded fleet not economically justified by traffic potential. Sen. Owen Brewster (R., Me.), a leading advocate of prototype development, also has a commercial jet development program.

From the practical standpoint, however, the program, aimed primarily at benefiting the commercial sector, has little chance for obtaining congressional approval.

"Considering the present state of the country's economy," Johnson commented, "the only program which Congress will approve will be one to increase the airlift and needed on the basis of national defense need."



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- The main circuit breaker opens the generator feeder under all fault conditions before the reverse current relay opens.
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New ADEL poppet type selector valve No. 21789 featured leakage in neutral position 1 drop per minute maximum at 3000 psi. When in neutral, cylinder lines vented to return. Can be used as a pair of separately convertible 3-way valves, 1/2 and 3/4 inch line sizes.



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swept back 45 deg. and decreased the lift curve slope slightly with the wing swept forward 45 deg.

Force of the nozzle did not appreciably alter the stall characteristics of the 45 deg. sweptforward and swept-back wings, but caused an appreciable reduction in moment lift for the wing in the swept-back position. The drag moment due to the nozzle was greatly lower for the swept configurations than for the swept-back case. Addition of the nozzle to the wing reduced the longitudinal stability of all the swept wings.

► **Gas Dynamics**—The extreme altitudes at which sounding rockets and missiles operate have introduced a new field of fundamental aerodynamic research. At these heights the air must be considered as composed of individual molecules rather than a continuous medium. New facilities have been utilized for exploring the phenomena encountered in very low density flows. Difficult problems of technique have been encountered in the design of these facilities and the greater part of the effort has been concentrated on the development of research methods.

One example of difficulties is the visualization of low-density flows. At very low densities the schlieren technique for flow visualization becomes impracticable or expensive. A new and promising method of flow visualization has been investigated in which the phenomenon of refractive index is used.

► **Heat Transfer**—Because of aerodynamic heating, operation of aircraft and missiles at high speeds is dependent on adequate insulation and cooling systems or on lowering the heat of high-speed flight itself. Calculation of surface temperatures and the design of cooling systems are dependent on adequate heat-transfer data and on a body of theory, by which the data may be correlated and their application extended.

Experiments have been conducted during the past year to determine heat-transfer coefficients in supersonic speeds. During the course of these experiments, comparisons were made with theoretical results, which indicate the direction of the heat flow, is from the boundary layer to the surface.

► **Stability and Control**—Development and dynamic pattern characteristics behind various swept wings have been investigated. It was found that, for the range of configurations tested, a low tail position provided the most satisfactory stability characteristics. Center of the wing was found to be located in a higher position for sweptforward than for sweptback wings.

Effects of tail length and volume on longitudinal stability characteristics of a powered model of a propeller driven

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strike plane and the North American XAJ. Today, governed by the Aeroproducts Electronic Turbo Propeller Control, the XP5Y-1 installation delivers more propulsive power per pound of airplane weight than many lighter planes receive. This program typifies what is expected from Aeroproducts—and General Motors Research—in working and planning for progress within America's aircraft industry.

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derivative indicates effects can be predicted with fair accuracy.

Control—An analytical and experimental investigation of the effect of planform changes on lift and drag moment characteristics of control surfaces has been made at the Ames Lab as a continuation of an extensive control program. Significant experimental results obtained in the investigations have been compared with various theories for predicting lift and drag moment parameters for conventional and swept-back planforms, and readily revealed a method of prediction sufficiently accurate for preliminary design purposes.

As part of the Ames program, high speed tests of lateral controls of a swept wing were run to improve the low speed stall characteristics indicated that the performance characteristics will have no appreciable effect on high speed control characteristics.

To permit intelligent selection of aerodynamic features, the drag characteristics of various devices, as measured in flight and on wind tunnels, have been collected and summarized. Calculation procedures and graphs have been prepared that simplify determination of speed-altitude time relationship for airplanes equipped with aerodynamic bodies in various specified categories.

Investigations have emphasized that, particularly at supersonic speeds, large bending moments are imposed on a wing by deflection of a trailing edge control. Hence, increased stiffness is required at supersonic speeds to prevent elastic reversal is much greater than that required of subsonic wings. A study of wing bending moment imposed by trailing-edge deflection on swept wings and the resulting wing bending and accompanying loss of rolling effectiveness has been theoretically tested in the supersonic flow.

Aerodynamic Controls—Research on automatic controls has been greatly expanded, not only because of the increased interest in the field of guided missiles, but also because of the interest in automatic control applications to airplanes. Studies of some current and projected airplane designs indicate that their flying qualities can be improved through the use of automatic devices.

As part of a control systems study for fighter-jet aircraft, work has been done at the Langley Air Flight Tunnel to determine the subsonic lateral stability of a flying model equipped with a gyro stabilizing unit which applied control in response to bank and yaw. Free-flight tests were made with a balancing control system installed in the model and with the system modified to produce a banking control which effectively gave proportional response. Effects of varying the roll angle and rudder deflections were investigated.

The normally small test, high reliability and high maneuverability requirements of guided missiles necessitate intensive stabilization system research in its design and its response characteristics. The Langley Lab is studying factors limiting the response of basic types of automatic stabilization systems and the relevant aerodynamic characteristics of automatically stabilized missiles, in an effort to achieve the necessary response characteristics.

Study of 35-Deg Sweep-Flight tests of an airplane having a 35 deg sweep-back wing have been completed. Results point out the lateral and directional stability and control characteristics of the airplane with and without an 80 percent span slot and with and without a vertical fin. The flight investigation showed that the directional stability of the airplane was positive in all wind tests, but was reduced to an undeniably low value at high lift coefficients with the vertical fin removed.

The pilot considered a slight negative dihedral effect, present at low lift coefficients, more objectionable than a high positive dihedral effect present at high lift coefficients.

The longitudinal stability with an 80-percent span slot on the wing and with the flap control was high throughout the speed range. With flaps down, the longitudinal stability became neutral or slightly negative near the stall. Stability characteristics of the plane were considered good when the 80-percent span slot was used.

At present, flying quality characteristics can be positively compared with specific quantitative requirements except for the wing area and the behavior of the airplane in the complete stall. To provide a preliminary basis for quantitative evaluation of the stall warning characteristics of plane, a study has been made at Ames correlating model apparent stall and wing area proportion of 56 airplanes with a number of quantitative factors predicting the warning.

Results of this study indicate the qualitative ratings over which stall warning tests and warning means for preliminary rolling motion, banking and manual travel of the control stick. It was found that the degree of banking and recovery moment of the stick increased with recovery at a stall warning is influenced by the magnitude of the rolling velocity, in the complete stall.

Results of an analysis of various effects show that action of the effects is such as to increase the damping effect of recovery of the airplane and lateral effects, then leading to positive spin. A study of down force, in conjunction with this project shows that these investigated had little effect on the spin and recovery characteristics. A check



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of the effect of tail length on maneuver characteristics showed that a model with a long tail length had better maneuver characteristics than one with a short length where the models had comparable values of tail-damping power factor or even when the damping factor for the short tail model was positive.

High-Speed Piloted Research: The NACA, in cooperation with the USAF and Bucker, continued transonic flight checks of full-scale cockle at Edwards AFB, Calif. The X-1 and Douglas D-558 II were flown repeatedly at supersonic speeds and, in addition, at successful flights were made with other research airplanes. These investigations have extended the knowledge of the aerodynamic characteristics in the high-subsonic, transonic and low-supersonic flight regimes.

During the past year the longitudinal stability of the Douglas D-558 II in accelerated flight has been studied and buffet boundary determined. The dynamic lateral stability and approach and landing characteristics have also been studied.

Measurement of the general aerodynamic characteristics and stress distributions of the Bell X-1 was continued. Data have also been obtained for the desired stream field during glides at high Mach numbers. Some of the longitudinal stability and control characteristics of the configuration were determined also by the free-fall model technique. The control surfaces were automatically controlled, producing a constant value of normal acceleration throughout the speed range of the drop.

As one phase of the research airplane program a series of "free" tests on a model of a scale model of a high-speed plane to determine static lateral and longitudinal stability characteristics at low and high subsonic Mach numbers. The study included measurements of the effectiveness of wing flaps, horizontal tail and ailerons as well as measurements of forces and moments acting on magnetic sensors and auxiliary fuel tanks.

Investigations have also been carried out on models of a tailless glider, a nasal (jet-fan) and transonic wing aircraft at subsonic and supersonic speeds. Another investigation was concerned with the determination of the three longitudinal stability and control characteristics of a model of a conventional-type airplane with rigid and articulated propellers.

Captions, Surfaces: As part of a study to establish satisfactory helicopter rotor configurations, rotor systems and its dynamic means of achieving these requirements, it was found that the present condition of current rotor systems with angle of attack, in for

ward flight, control stability in forward flight, particularly for the smaller rotors, and control forces following control movements during maneuvers. Suggested remedies for these problems are being investigated.

Hydrodynamic characteristics of high length-basis ratio hulls have been examined to establish their motions while moving on the surface. It is concluded that when the product of length squared times basis is held constant, it would very nearly be the case for interchangeable hulls in a given seaplane, the motions in turn and rise and the maximum probable vertical acceleration in waves are substantially related as the length-basis ratio is increased. Maximum probable angular velocities are increased until extreme length-basis ratios are reached because of the increase in hull length associated with decrease in basis for a specific design.

PROPULSION

With the emphasis on higher speeds and on increased altitudes the objectives of propulsion research are to obtain a maximum of thrust for a minimum of engine frontal area, engine weight, fuel consumption and maintenance effort.

In achieving a greater thrust per unit frontal area the aerodynamic aspects of high-propulsion research have assumed increased proportions and a need for further aerodynamic studies of propulsion problems is apparent. To obtain increased thrust per unit engine weight the research approach starts with the type of power plant. For turbojet engines emphasis is being placed on comparison of general engine performance and increased size, such as supercritical compressors.

To obtain increased thrust per unit of fuel consumed an action in the pressure ratio and operating temperature of gas turbine engines is indicated. What is being placed on possible simplification of the design of components to reduce the manufacturing effort required.

Rocket and rocket power plants are inherently suitable for high-speed flight, since their elements are directly related to a minimum of frontal area and weight, and requiring a phase in choosing improved performance.

Performance: In investigation of hydro characteristics of a conventional compressor type turbojet engine has been completed. Results indicate that under standard atmospheric conditions but three per cent of fuel is obtained at the theoretical maximum, but in practical performance, by conventional gas turbine engines but it was found that these were not applicable to these engines above 20,

000 ft. because of a change in compressor performance with decreasing Reynolds number.

Investigation of two and four turbojets provided data on engine and component performance for altitudes up to 70,000 ft. and flight Mach numbers up to and exceeding the speed of sound. The data have been analyzed to show the performance of each of the major components of the engine. The combustion characteristics and blow-out limits were of particular interest.

A rocket engine was investigated at simulated altitudes to determine an efficient combination of flame holder and fuel. A series of flame holders was checked, using several different fuels. Results indicated the relative combustion efficiency obtained with the different fuels, as well as the effects of these holder configurations on combustion temperature and efficiency and operating range of fuel-air ratio. Several flame holders and fuel-air ratios have been examined in experimental engine tests using a test engine (single engine) with a subsonic flow section. Because the combustion process in a rocket engine may affect the efficiency of the engine and hence the net thrust obtainable, a study of the interaction between the combustion process and nozzles was made.

Fuel-U-8: Turbojet engines have been developed to operate with increasing in high engine profile. Consideration by the military service and the NACA has been directed to develop a turbojet that is a natural emergency such fuels would not be available in sufficient quantity for an air force with a large number of turbojet aircraft. A tentative emergency fuel was studied that would include both the actual production from a barrel of crude oil and this had been subsequently designated ANF-58 by the military service.

The Lewis Lab checked the performance of the new fuel in current production turbojet engines. Two all-oxide hot chambers, the altitude and thrust and light test engines were conducted.

Results showed that ANF-58 fuel gave performance equal to practically every aspect to that with the standard fuel.

Combustion: Rocket combustion requires stable, efficient burning in a high velocity air stream with a minimum of physical obstruction. Because basic research showed the high efficiency of nonobstructed surfaces in supporting and stabilizing combustion, a performance comparison was made between a conventional single ring combustor and burner-coupled 3 to 4 rows of jet air inlets in the combustion zone.

Compressor: Several studies were conducted to determine performance



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the Langley test journal of the effect of wing sweep on the post-buckling behavior, extracted and the results support previous findings that the maximum deflection moment of an airfoil with a swept wing will be generally less than that for one with a nonswept wing under the same set of flight conditions.

► **Stability**—Thermal results on the stability of various structural elements have been extended through broad tests of experimental tests in press, data in the form of convenient design charts. Design charts have been prepared on composite buckling strengths of simply supported flat plates reinforced by longitudinal stiffeners, now in a right design of composite panels with clamped stiffeners, large isotropic stiffened panels of a variety of materials and panels using A and Z type stiffeners. The A stiffeners, previously developed, are modeled by curved ribs and results showed increased efficiency in panels designed to fail at high stresses.

► **Fatigue of Metals**—For studies of metallic specimens, it has been found that there is insufficient data available on the stress concentrations produced by notches, holes and fillets. Photoelastic investigations have been conducted to provide the necessary information.

The Langley Lab has studied the effect of plasticity on stress concentrations.

In the vicinity of holes, notches, and other discontinuities of structure, high-stress peaks are developed when a load is applied. If the peak stress is beyond the elastic limit of the material, there will be local plastic yielding, after which the load, residual stress will remain in the structure and the peak stress caused by successive applications of the load will be decreased. This phenomenon was studied by tests on a series of large panels with round holes and the results are expected to be useful in developing methods of fatigue analysis.

OPERATING PROBLEMS

Important experimental results were obtained on effect of flight speed on aircraft operation, consisting of V-G record study, pilot opinion, by using flight models with piezoelectric sensors, noise, by investigation of several commercial airliner designs which proved relatively ineffective, and finally, by test tests of models of current four-engine commercial transports in cooperation with CAA.

► **Fire Prevention**—A bibliography has been assembled and a study is in progress on data obtained from aircraft fires. Study of flame propagation is being conducted by observing spread along an air stream over a flat surface, in a duct and over the external surface of a streamlined body, using a stage of combustible material to transport.

In addition, a program of development of nitrogen transport aircraft has begun to determine through instrumentation the ignition and spread of fire following a crash. Work is also in progress to determine the state of development of low flammable lubricants and hydraulic fluids, to establish guides in undertaking research leading to the discovery of new compounds or additives.

► **Ice Protection**—Large amounts of design data are now available on the protection of wings, fuselage, propellers and jet engine intakes from effects of snow, ice and water impingement. A study of data on propeller icing indicates that with an ice protection performance factor normally would be low and that large performance losses would be rare.

Jet engine ice-protection methods as direct investigation include methods application of freezing water from the air before it reaches the engine, heating the incoming water vapor above freezing by using hot gas from the combustion chamber and injecting it into the air at the duct entrance and heating the critical surface of the duct and engine to prevent freezing of impinging water.

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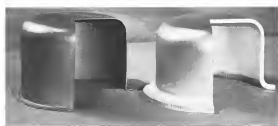
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AVIONICS



Master control console for engine and drive system for aircraft generation under test in new Boeing airplane Co. electrical labo-

rary. Operator feeds power source through double-blind, soundproof window. Tech. wire is adjusting generator.



Electrical mockup is operated from pilot's panel. Outfitting according to standard.

Lab Speeds Electrical Proving

Boeing's new research and test facility avoids plane tie-ups. Assignments from other companies undertaken.

An electrical laboratory expected to eliminate nearly all developmental flight test time previously required for aircraft generating and distribution systems has been placed in operation by the Boeing Airplane Co. at Seattle, Wash., in cooperation with the U.S. Air Force.

Cost of the lab has not been revealed, but is believed to be well in excess of \$100,000.

Considered the most advanced and versatile electrical research and test facility in the aircraft industry, the laboratory will avoid the extended time of research, coupling, airplanes for electrical test programs, believes Karl

Masterson, head of Boeing's scientific and electrical unit.

Virtually all electrical research and testing, with the exception of effect of engine vibration on the electrical system, can now be done in the laboratory while the plane is still in the mockup stage.

Thus pre-testing should materially reduce the cost of airplane construction by elimination of delays and rework on electrical installations.

Outside Projects—Along with the logical company to develop such a laboratory, it is probable the most highly detailed aircraft in the world, the Stratofortress, for example,

some 100 individual tasks are performed electrically. With large aircraft, the increase in speed and load-carrying capacity has been accompanied by a comparable increase in dependence upon electric drives for both vital controls and auxiliaries.

Although most of the work in the \$100-sq. ft. lab will be under AF contract, potential is not limited to aircraft work. Boeing already has accepted projects from manufacturers of aircraft electric accessories, as well as from the aircraft industry, and probably will accept more such assignments in the future. New instruments are developed by a staff to protect a manufacturer's secrets.

The laboratory is staffed by some 50 engineering specialists in mechanics, electrical power, hydraulics, radio, etc. and 17 technicians.

► **Power Practice**—It is the intention to use Boeing established during the war for the C-97 and later the Stratofortress. Early testings had to be done on the finished aircraft. This procedure was difficult not only because of cramped quarters but because the engines had to be run to operate the generator. On the ground, these engines heated up quickly and thus had to be shut off frequently, preventing a continuous check on the electric system.

The original laboratory, although it could test the preloading of generators and the protective features for generators and more but last, could check only half the generating system. It also left untested the main bus, the electric loads and the distribution system from main bus to loads. Consequently, flight test time still was necessary to check these items under actual operating conditions.

► **Electrical Mockup**—In the new lab, the complete electrical installation for each new type airplane will be "mocked up" generally as it is intended to appear in the craft.

Presently, two such mockups are in place, one a research apparatus involving a 120-v. d.c. system for aircraft, another duplicating the 24-v. d.c. system of the B-47's to test for slack damage.

In the \$100,000, mockup area, the complete electrical system is strung up on control skinnerman work. The ceiling is at about 100 inches to simulate aircraft conditions, then making the impedance of conductors to that of current almost identical to that found on the airplane.

The engineers do not test the components as such but the assembly of components only the electric system. Whenever possible, actual components such as fuel boost pumps are installed in the mockup. The first engine does

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Flying in tight formation at speeds as fast as sound calls for extreme precision on the part of today's jet pilot. But to jet flying there is more precision than meets the eye. For instance, keeping a gas turbine spinning at rates as high as 40,000 RPM requires bearing technology measured in millionths of an inch. ◊ **Better bearings**—because they are the finest precision bearings made—can save by nearly all manufacturers of jet aircraft engines. Pratt & Whitney, General Electric, Westinghouse, Allison, etc.—all have found Bower bearings thoroughly capable of standing the enormous speeds and temperatures as common to jet engine operation. New materials pioneered largely by Bower have proved more than equal to temperatures up to 600° F. And Bower bearings operate with complete efficiency as a "lubricated disc" of lubricant. ◊ This is an excellent example of the high performance of Bower bearings in the aviation industry—bearings that are outstanding for precision, durability and quality.

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son use gasoline, because of its high cost, but efficiency in oil and water mixtures.

► **Cockpit Noddyga Placard**—Temporary as changing loads, such as landing gear and flaps, where these vary with the displacement, are simulated by the use of resistors. Actual gear and flap motion are used, but instead of powering the actual units, drive devices supported dual pump lines providing the proper amount of mechanical resistance.

The entire electrical hookup is operated from a condensed version of the pilot's panel. The only controls are switches for the equipment operated by electricity—gear, flaps, fuel boost, control-surface boost, aileron boost, rudder and elevator boost, deflation, brakes, and maintenance loads simulated by use of resistors.

The test hookup to be built will have a complete cockpit, making possible the testing of flight control systems in a simulated environment.

Loads for each flight condition can be duplicated with the panel switches. To test the plane's starter, for example, switches may be thrown that start fuel and gear boost, setting up a condition similar to the starting of a plane's engine. Dynamic loading tests may be simulated to get an even closer approximation of the starting loads of jet engines.

► **Engineer's Load Details**—These Ford V-8 gasoline engines drive the main number of d.c., single-bearing generators, developing a possible maximum of 310 kw. (Essential equipment is planned with three electric motors of twice the capacity.) Voltages range from 100 to 410 and amperages up to 3100.

The current generated is used to power a d.c. traction motor which, through a step-up gear, drive a flywheel generator under test.

The coupling between each gasoline engine and generator is rigid, radially

adjustable. Attached to it are 16 distributors placed in the timing laboratory.

and temporarily but flexible longitudinally, thus permitting the generator stator to act as a flywheel for the engine. The generator fan is rigidly with the coupling, and the generator frame is firmly mounted on the engine. Each engine-generator set is supported by vibration absorbing shock mounts. All connections to the engine are flexible, so vibrations will not be transmitted to the lab.

Each engine has two power takeoffs, each consisting of right-angle drive, universal and Y-helms, for driving a belt of four machines (battery-charging generator and three amplifiers in series).

And each assembly has an auxiliary compressor for mounted on its shaft for circulating air through the engine's radiator.

Each battery-charging generator is rated at 6 kw., 30v. d.c., and is used to charge 24v. batteries needed for amplifiers, resistors, power control and engine starting. One amplifier on each engine is used for generator excitation and the other two for field excitation of the motor to give speed control. Each has an output of 9v., 15 amp., with two 120 volt-ampere control fields and one 125 amp. Output of each is connected directly to the field of the machine it serves.

► **Control Console**—The engines are started from a control panel in the engine room, after which they usually are run from a master control console in the laboratory. This console consists of three separate master panels, with all controls and instruments for one engine and two electric motors on each panel.

Through this console, engineers can obtain and hold any desired speed on the generator, up to 3612 rpm., variable to the speed of the generator on any current or primarily control-plated resistors.

The master console is the equivalent of that part of the pilot's controls with

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which he applies power to the airplane's engine.

Visible from the cockpit through large double-pane, soundproofing windows are six 55-hp drive shafts and mounted motor, rev-counter, and a rev-counter located in the generator drive room.

Each motor is directly coupled to a full speed-reversing gear with a ratio of 4:1 to one. When suitable adapters are provided, each motor and gear can drive two aircraft generators, thus making a total of 12 generators under test at one time.

A blower driven by an 85-hp motor sends cooling air to each generator in the air duct leading to each of the generators is a calibrated flow tube, from which air is piped to a micrometer panel in the laboratory. A sound-reducing, resistance-type flow-meter enables the console operator to read values of air temperature in each tube.

► Recording—Above the console, a load-spike circuit at the wall of the apparatus, the sound of each engine as picked up by a microphone mounted on the engine head. The operator has a hand microphone through which he may speak to technicians in any area of the lab.

Forward from the generators reaches the metered-up system through cables identical in length, size and number to those of the airplane. These cables can be plugged into lead banks to check performance of the generators under load.

Five reactor panels provide the exact live load necessary for testing a c generator.

Two oscillographs and oscilloscopes are used to record whatever electrical information is required. A light beam moves with the amount of current in a circuit and is reproduced on the oscillograph, representing current in terms of undulating of a record.

These oscillographs record anything that can be translated into an electric current: the current itself, the voltage, time, length, power, shaft, etc. They can be used to check whether a relay opens or closes too fast or too slowly, whether instantaneous currents and voltages are constant or too low, etc.

The laboratory includes a shielded room, five foot drive, where noise research and development is conducted, and a dark room for development of oscillograph and study of cockpit lighting.

Altogether, the lab has 14 working centers. Each has access to 6, 12, 24, 36 and 120 h.p. d.c., 230/115 v., 480 cycle a/c, 120, 240 and 480 v., 60 cycle a/c, as well as gas and compressed air. The various centers can be connected directly through transfer circuits.

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FINANCIAL

1949 Good to Lockheed, Douglas

Companies had year-end backlog of over \$200 million each; both showed profit on commercial work.

Financial strength among key aircraft manufacturers is becoming more evident with the release of annual reports for 1949. Among the recent accounts revealed and displaying healthy attributes are those of Lockheed Aircraft Corp. and Douglas Aircraft Co.

Lockheed is particularly noteworthy as one of the few recovery stories the company has made during recent years. At the 1946 year-end, the company carried a very heavy inventory position (\$13 million) and was in debt to banks for \$60 million.

As of Dec. 31, 1949, inventories had been reduced to about \$15 million, and were no longer suspect, as they were a few years earlier. During 1949, the management liquidated all bank indebtedness, repaying the remaining three installments totaling \$5 million on notes maturing by July, 1951. With this action, Lockheed became free of all bank debt for the first time in the postwar period.

Lockheed Earnings—Earnings for Lockheed also are well-maintained, amounting to \$5,191,300, equal to \$8.10 a share for 1949. This compared with \$6,219,093 or \$9.93 per share for 1948. Where it met its obligations belonging to previous years and amounting to \$1,175,948, resulted to and reducing the 1949 tax liability, earnings for the last year would have been less.

An important slight setback that entered at taking orders in postwar has credits in the carry-back of spending losses of past years, Lockheed at again an important contributor of tax money to the federal treasury. For example, during 1945 and 1947, with spending losses incurred, although as taxes were paid in fact, substantial tax credits, amounting to more than \$18 million were received.

During 1948, the carryforward tax credits resulted in a net saving of about \$2,800,000 and served to keep the total tax support for that year down to \$1,385,844. Without the special tax credits resulting from accumulated adjustments at 1949 year-end, the 1949 tax advantage would have amounted to \$2,225,000.

Wires, May 27. Lockheed was \$225,465,000 at the 1949 year-end, compared to \$195,901,300 a year earlier. The company is unique in that about 31 percent of its total backlog is represented by commercial orders. This amounts to 45 percent of the entire account of commercial orders as reported to the U. S. Bureau of Census at the 1949 year-end.

Incentive Contracts—It is this steady production flow of planes' series which is conducive to efficient and economical operations, advantages to the government in lower costs and desirable to the company because of greater profit incentive. Nearly all of Lockheed's military business received last year was under the so-called "incentive" contract.

These incentive contracts provide that any savings the company makes below the price minimum originally set for new airplanes are shared both by the company and the military service. One-third of this type gives the company 30 to 35 percent of these savings and return the rest to the military service. On the other hand, company can be penalized 10 to 25 percent of over-expenditures. The management discounts itself in favor of target contracts because of the strong incentive to cut costs by providing a percentage on increased efficiency.

Dividends paid during 1949, amounted to \$2.08 per share. While there were up from the \$1.93 per share disbursed during 1948, they were less than 40 percent of available earnings. With the heavy debt retirement program completed, it is conceivable that with increased sales and earnings prevailing for 1950, there will be strong pressure for increased dividend payments this year.

Douglas Strength—The distinctive of having the strongest financial position among the major aircraft builders probably belongs to Douglas. As of Nov. 30, 1949, the company had net working capital above of \$95.75 per share. Net worth or assets as of same date aggregated \$222.05.

Both of these valuations were down very noticeably from a year earlier. This decline did not dent the stockholders. While the company earned \$9.19 per share last year it paid total div-

idends amounting to \$9.25—giving the company the accolade of being one of the very few industrial enterprises in the United States paying out more than it earned in the year in question.

There is good reason for the Douglas management to follow the liberal course. In the first place, its operating requirements do not require the hoarding of any additional capital in stores. Moreover, with a backlog of \$275,490,000 at Nov. 30, 1949, compared with \$232,998,000 a year earlier, more than a year of good business appears ahead.

Douglas has probably paid out a higher percentage of its postwar earnings in the form of dividends than any other aircraft company. For the years 1945 through 1949, dividends of \$19.25 per share, equal to more than 55 percent of the reported \$35.99 net earnings during this period, have been paid.

Sales Down—With a modest decline in sales from \$118.6 million in 1948 to \$117.4 million in 1949, net earnings also decreased. Net income for 1949 amounted to \$5,538,700 compared with \$5,538,300 for 1948. Actually, however, the management showed an improved control over operating costs. For example, cost of sales, amounting to 32.2 percent for 1948, was down to 31.6 percent the following year. Selling administrative and general expenses were similarly reduced from 5.2 to 4.9 percent.

These gains were largely offset by the increase in experimental costs from 1.6 to 3.4 percent. These experimental costs amounting to \$4,064,857 for 1949, were possibly attributable to development costs incurred on the Super D-4C and the D-4D.

Douglas provided \$3,177,000 for its depreciation for 1949, compared with \$2,563,492 a year earlier. This is a sharp contrast to the tax credits from carry-back of spending losses received during 1945 and 1947 amounting to \$4,500,000 and \$12,640,000 respectively.

An interesting note is appended to the Douglas 1949 financial statement in respect to potential tax liabilities that may be imposed upon the company. The Treasury Department is considering that two adjustments for 1946, 1947 and 1948 should impose an additional liability of \$6,680,000 plus interest. The company does not agree with this view and has made no provision in any annual reserves for this contingency.

The 1949 results of Lockheed and Douglas are highly significant in that both companies have demonstrated the ability to share profits with their commercial business. It is equally noteworthy that the two management teams express enthusiasm in underwriting the development of new transports as represented by jets.

—Selig Altschul

The 700-mils-per-hour XF-88—powered by a WESTINGHOUSE J-34 turbo-jet engine. THE TURBINE CONTROL for this engine is manufactured by HOLLEY.

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INTEGRAL COUPLINGS set at required angle in post plus factor of Arco's pipe

Flexible Metal Pipe for Jets

Custom made tubing with integral angle couplings saves space and weight and increases safety.

Custom made flexible metal pipes specially suitable for use in jet engines are being marketed by Arco Corp., Portsmouth, N. H. They can be supplied with integral angle couplings set at one of an standard angles from 90 to 165 deg., and in several different models to meet specific design requirements of so-called customers.

According to Arco, one of the basic with its special couplings permits savings in weight, space, installation and maintenance time by eliminating extra joints required when separate elbows, tees, and other fittings are used. Also, piping units can be shortened and they have break resistant, giving a compact, straight-forward installation.

These flexible metal pipes are corrosion resistant and reinforced with wire braid to enable them to carry fluids and gases. They can be used in fuel, oil, hydraulic and high pressure systems where high ambient temperatures are encountered and where conditions of vibration and flexing must be met. They already are being used in some of the latest aircraft engine jet engines which have been developed.

High Temperature Use.—Available in stainless steel, Inconel, Monel and Arco, pipe ratings in sizes from 6 to 18 in. i.d., covering in lengths specified by purchaser to meet his particular design requirements.

Stainless or Inconel steel pipe and fittings are recommended where ambient temperatures around 1500 F are encountered. Slightly better than corresponding sizes of Arco synthetic rubber hose assemblies, these pipes can be used, for example, in installations where it is necessary to carry fuel to the after burner of a jet engine. For temperatures

up to 1000 F, Monel line and fittings are used.

For pressures up to 1000 psi where compressors do not exceed 100-600 F, Arco can be used. Arco says its Arco flexible pipe has "greater resistance to lighter weight" than conventional synthetic rubber hose. In one instance, Arco adds, this saving was "half the weight of the synthetic rubber flexible pipe which it was designed to replace."

Coupling Advantages.—Hose can be fitted with straight couplings, or integral angle couplings at both ends set at any specified angular relation (up from 0 to 360 deg). Couplings are supplied with sealed ends to resist water and 1000 psi.

According to Arco, its integral angle couplings "take up far less space than the standard straight welded end hose coupling with the separate elbow." For this, "individual elbows in AN specifications are only available in 90 and 45 deg angles whereas the Arco coupling can be had at any desired angle."

Couplings of the type also are available with copper's synthetic rubber, AN H-14, and double wall butyl rubber hose AN H-15. For use in ambient temperatures up to 280 F, these hose types also may be fitted with "T" or "Y" or other special couplings if specified.

While couplings generally come in standard angles, Arco will make them to any angle to meet special design problems.

Arco Corp. is now more for firm which, until recently, was known as Arco Incorporated.

Airport Lighting Aid

For use with airport lighting equipment, current selection consists of several types designed to meet CAA Specification L-816 and L-817, are sold by Westinghouse Electric Corp., Pittsburgh, Pa.

Suitable for areas or multiple open areas, colors are used for the selection of runway or taxiway lighting circuits supplied by constant current regulation of line rating or less, having 5 to 10 amp-second, or by transformer with 600v. secondary.

Relays or contactors of cabinet assemblies are controlled remotely from starter control tower or operations center in select demand lighting circuit. Both single-circuit and three-circuit assemblies are available.



Small Regulator

Miniature electronic regulator, now getting what a chance to be first. Yal also current device for engine positioning control, is introduced by Aerospace Mfg. Co., 9551 Sepulveda Blvd., Los Angeles 45, Calif.

Because of its low size, features, the device is "the long needed answer to such aircraft applications as automatic trim, auto adjustment and multi-engine throttle control," according to Aerospace engineers. If engine system fails, unit instantly "locks" until manual control can take over.

Also suitable for automatic temperature and pressure regulation "to micro scope diagram" regulator can be used for carburetors and other air temperature control air-sensing control and other pressure sensing control. It is designed to meet conditions demanding variations as low as 0.1 per cent.

Fail safe feature is incorporated in period circuit about one of switches. New methods of producing printed circuits "make but production of such electronic units more feasible than ever before," the writer says. Regulator is about 1 in. square and weighs less than 2 lb. It is a variation of the company's previously announced electronic "Weather Hawk," but modified for more general use.



Fatigue Tester

To check aircraft parts and components weighing up to 100 lb., Model 100-15A-1 vibration fatigue testing machine has been developed by All American Tool and Mfg. Co., 105-W, 1st St., San Jose, Calif. 95128.

Device is designed to provide smooth, stepless acceleration from 10 to 100 g's, either manually by turning knob on control panel or automatically with random vibration and deceleration, controlling cycle within 1 sec.

Cycle can be stopped at any point to take readings, and when operating automatically, it is possible to select any desired frequency range within the above-stated g's limits at the rate desired. Frequencies are recorded on an electric kymograph.

Equipment includes GE Ther-Mo-Trol electronic drive, capacitors as shock absorbers, electronic control panel with seven relay tubes (right background), audio transformer (left background), and 2 hp., 4-cu. motor drive between 1/2 hp. motor and acceleration control panel (right foreground).

Runs at constant 15 or 18 in. per sec. in any table which has tapered base. When run is produced on horizontal plane and displacement (table) can be set parallel from 0 to 135 in. Machine will produce 180 to 100 lb. table load.



Engine Controller

A pressure-actuated automatic engine controller for engine-driven pumps on fuel tank trucks, patented by A. O. Smith Corp., Meter Div., Los Angeles

22, Calif., is stated to save operator's time, produce, and engine wear.

Control uses diaphragm which reacts in response to rising pressure on fuel tank side of transfer pump. Diaphragm movement is linked to throttle, and to fuel delivery system.

Device is stated to eliminate need for operator to shift power taken to turn pump and set up engine manually to pumping stroke, return to idle, increase to make delivery, and return to engine to reduce speed.

Controller is also claimed to close valve on engine gas during true engine operation at pumping speed but not pumping. Installation is said to take 1 hr. or less.



Lightplane Radios

The lightweight VHF transmitter, one permitting installation in conventional spot, the other designed to meet minimum space requirements of personal aircraft, have been announced by Lase, Inc., Grand Rapids 2, Mich.

Model RV-10CR (top), having 60-watt output, 2 watt output, permits placement of equipment in a location other than the instrument panel. Cable giving acoustic control of transmitter with electrically actuated volume pilot device also permits flexibility in positioning transmitter. Weighing only 15 oz. and with overall dimensions of 11 x 22 x 7 1/2 in., transmitter easily fits into side of the way places in the fuselage. Selector measures 1 1/2 x 1 1/2 x 1 1/2 in. and weighs 10 oz.

"Pneumatic" VEF set (bottom), Model RV-10CR, with integral antenna, takes up 10 in. square space on the front of instrument panel. With basic output as Model RV-10CR, this transmitter weighs only 10 oz. and measures 7 1/2 x 10 x 7 1/2 in. overall.



Subminiature Relay

Small relay for guided missiles or aircraft applications, designated series SM, has been developed by Taurus & Burdick Mfg. Co., Inc., Princeton, Ind.

Device can be used with miniature socket and should not require spring, permitting mounting in inverted position without working out of socket. Unit is available with coil power ratings up to 3.75 w., and with d.c. windings from 155-6000 ohms for operation from 0.5 to 110 v. d.c., and intermediate adjustment for current operation to pull in as 1 millampere at 75 milli ohms.

Circuitry elements are heretofore sealed in miniature glass tube envelopes with standard seven-pin bases. Also available in open-type construction with angle screw mounting.



Tiny Switch

For installations where space and weight are factors, a subminiature, glass-encased, snap-action precision switch measuring .09-1/4 x .3 x .1 in. is made by Micro Switch, Freeport, Ill.

Designed 1951, it has a pre-plunger actuator, and current-carrying contact is single-pole double throw. Terminal are solder lug type. Testable characteristics are: Maximum switching force 7 oz.; maximum actuator force 1 oz.; maximum on-current load 500 m. a.; maximum power 100 m. w.; maximum voltage 600 v.; maximum capacity 100 ma. at 250 v. a. c., 115-230 v. a. c., and 2 amp., 250 v. d. c.

Electrical capacity tests indicate a rating of 5 amp., 115-230 v. a. c., and 2 amp., 250 v. d. c.

PRODUCTION



OUTGATE of Boeing gas turbine that now is being placed on public exhibition.

Boeing Readies Turbine for Market

Boeing is devoting intense attention to the development and potential marketing of the gas turbine, two recent announcements indicate.

First, by Mermon, staff assistant to William M. Allen, Boeing president, has been appointed manager of the gas turbine project, thus giving the program the status of an independent development project.

He was a vice president of the Washington National Security Board, before joining Boeing in 1959 and has been named in production program, test program and general management of Boeing Aircraft of Canada, Ltd., and is now assistant of Boeing management in Southern California. The project project manager will be D. D. Page, who has been in charge of Boeing's propulsion development unit.

Second, Henry C. Hill, development chief for the project, announced to the Southern Civil Aeronautics Association in Galveston, Texas, that the gas turbine has been accessible to test on a limited basis on passenger gas.

Boeing has completed, Hill said, that turbine gas as well as liquid fuels can be utilized to power industrial applications of the turbine. The 200-lb., 1754-hp. engine has shown remarkable fuel versatility and is completely non-sensitive to

various oil grades, etc., Hill declared.

Performance Goals—Stressing the industrial application, the Boeing turbine has been developed and the program looks for its future refinement. Hill pointed out that its original specific fuel consumption of 14 lb. per hp. per hr. has been reduced to 10 lb. per hp. per hr. and horsepower has been increased from 120 to 175.

Boeing will exhibit a full-scale test model of the turbine for the American Society of Mechanical Engineers at Washington, D. C., April 12-13 and at the annual engineering display of the Society of Automotive Engineers' National Aeronautics meeting in New York, April 17-20.

Total '49 Sales Nearly \$2 Billion

Not sales of aircraft, engines, propellers, parts, and other products and services for period ending Dec. 31, 1949, totaled \$1781 million, according to the Bureau of Census and CAA. That first quarter amounted to \$2176 million (Boeing's Work, Feb. 27), and sales for the last quarter were \$1511 million.

Total backlog at Dec. 31 amounted to \$3011 million, \$155 million more

than backlog at the end of last year's third quarter. Backlog was divided: Aircraft and parts \$2065 million, engines and parts \$749 million, propellers and parts \$91 million, other products and services \$155 million.

New orders received during the last quarter of '49 totaled \$684 million, complete aircraft and parts being \$482 million, engines and parts \$163 million, propellers and parts \$7 million, and other products and services \$15 million.

Navy Awards

The Navy has announced the following contracts for aviation parts:

Boeing Aircraft Division, United Aircraft Corp., 10 Hawthorne, Ind., for engine parts \$100,000; \$100,000.

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Boeing Aircraft Division, United Aircraft Corp., 10 Hawthorne, Ind., for engine parts \$100,000; \$100,000.

LAA May Use ILS in Night Smog

Certification of Los Angeles Airways for night flight of helicopters under instrument conditions (see p. 10) not exceeding 15 minutes, was announced last week by the FAA. Announcement said that the helicopter must maintain a highly scheduled pickup and delivery, operations were hampered by the smog problem in the Los Angeles area.

CAA studies indicated that if the LAA helicopter pilots were allowed to fly over instruments while passing through the fog, they may later contact weather above or below it that a substantial improvement in schedule regularity would result from the procedure.

Approval does not extend to all helicopters for instrument flight, or

for other specific 3-5-1 helicopter flight rules by LAA but has been granted because of the special nature of the problem in the Los Angeles area and because of LAA's outstanding record of safety and dependability in more than two years of scheduled helicopter mail service, and its pilots' flight experience in the local area, CAA stated.

Other helicopter instrument flight restrictions may be extended to other areas in the future, have said, it was pointed out, and nationwide helicopter manufacturers and military and civil engineers are seeking to improve stability of helicopters and develop new instruments and flight techniques for all-weather helicopter operation.

populace. They could be fitted with the new props for about \$15,000,000, the being the direct cost which others will pay. The cost of the new props for the airframe while the props are not at service for modification. In the case of the L-9, that cost-effective period is extended of two years and not just one.

Teacher TWA. Constellation regularly are equipped with remote thrust propellers with the remote feature inside operable. This is because pilots flying these would also be flying other TWA Constellations interchangeably, and the availability of remote thrust on certain Constellation and not on others might prove hazardous under emergency conditions.

► **Milwaukee Can-120,770,000**—Equipping 231 engine DC-4s with new thrust propellers would cost a maximum of \$20,770,000—\$90,000 apiece. The expense could be held to this figure only if all the DC-4s were modified on a single contract basis—a unlikely arrangement.

Chandler said that use of remote thrust on the DC-3s by its manufacturer being leading way may be completely satisfactory and perhaps even more so. Even so, Douglas Aircraft Co. announced that during 4-12 scheduled airline DC-3s with the new props would cost about \$21,052,000.

► **DC-1 Outdated by 79**—The CAB Safety Board pointed out that the conventional DC-3 propellers will go out of scheduled airline service by the end of 1953 because of existing airworthiness requirements applicable to transport-type aircraft. Unless extensively modified, the DC-3 can't comply with these requirements.

Figures cited by Chandler show only the scheduled air carrier fleet and do not include the cost of modifying planes used by non-scheduled operators.

Eastern Reports 15th Profitable Year

Eastern Air Lines executives were down last year, but it still established a new record in air transportation with completion of 15 consecutive years of profitable operation—the company's 1949 record equal record.

Net earnings of \$1,367,945 or 82 cents per common share were reported for 1949, compared with \$2,146,471 or 98 cents a share for 1948. Passenger revenues increased \$2,990,114 during 1949 to a total of \$61,008,845. This year was attributed chiefly to expert selection reductions in passenger lines. Such expenditures, he said, included speed improvements, newly fly planes and aircraft services.

► **Divisions**—Kortum noted that all of these reduced first expenditures attracted new traffic and opened new markets to the

air transportation, but they also diverted an unknown amount of traffic from scheduled lines. The net result of that increase in use of scheduled service in average passenger fare was a result in cost in passenger revenues.

Not working capital for Eastern amounted to \$16,174,291 at the 1949 year end and was down slightly from \$16,355,124 reported a year before. During 1949, however, the company paid \$5,335,517 of its last loan, leaving only \$10,838,667 as of Dec. 31, 1949.

► **Obstacles**—The company is committed to purchase 37 new Martin 40-4s at a capital expenditure of about \$20 million during 1950 and 1951. It is anticipated that this financing will be done in part from accumulated cash and funds to acquire in the interim. If additional financing is necessary, the management notes that it probably will be done through increased bank loans.

With respect to 1950 President E. V. Rickenbacker anticipated that the transport industry in the next few years will drop large new orders for the transportation of passengers and cargo.

The extent to which this development might progress will depend on a large measure upon the decision of the Civil Aeronautics Board, according to Capt. Rickenbacker.

Faulty Procedure Blamed in Accident

Crash of an American Airlines Constellation 240 last June 22 following failure of one engine shortly after takeoff from Memphis Airport probably was caused by improper procedures used in the attempted climbout.

The Civil Aeronautics Board reports the transport was forced to make a climb landing after the engine failure because of its steep climbing attitude and restriction of the flaps, which destroyed the flap's climb performance. Loss of power in the right engine resulted from failure of the propeller shaft to turn because, which interrupted the flow of fuel.

Failure of 41 passengers and one crew member were seriously injured in the crash, and 18 passengers and two crew members sustained minor injuries. The Constellation was damaged extensively.

► **Tests Made**—Subsequent tests made by American and Consolidated Vultair Aircraft Corp. with another plane demonstrated the most conditions showed that the craft had satisfactory single engine performance (Aviation Week Sept. 5, 1949). "If the (Constellation) is properly flown, with the flaps remaining extended in the climb portion of 15 degrees and the air speed at around 120 mph, the craft will perform substantially as described in the flight manual," CAB declared.

The Board noted that the pilot's

failure to use the best emergency procedure may not have been entirely his fault. Information on flaps and single-engine performance with the Constellation was contained in the performance review of the CAA-approved surplus flight manual that specific instruction on proper procedure under emergency conditions was lacking in both the Civil Aeronautics Board manual and the Constellation's Constellation operating manual.

After the accident, Consolidated Vultair amended the Constellation Vultair manual to incorporate specific instructions concerning flap management in addition to including its specific single engine operation. Then American Airlines, which had left one of flaps to the discretion of the pilot, modified its operating manual accordingly.

► **Reverting Completed**—In the case of the Memphis accident, American was in the process of reviewing the accident threat from pilot and propeller shaft thrust system to provide greater information on the engine path which failed. This work, has now been completed on all of AAL's Constellation, and the trouble experienced at Memphis has been corrected.

During the Memphis accident investigation, the Air Line Pilot Association expressed concern that the night engine which failed was still developing full



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► **Cost**—Factor critical to the cost of transport system cited by Puck is required need for standardization of basic requirements by operators, for standard production, high black, good instruments for instrument operation, flexibility of structure, for various use, adequate capacity.

The Puck's executive indicated that while twin-engine helicopters were desirable it was believed that the ability of the helicopter to make reliable single-engine landings should be considered, and suggested use of floats for water emergency landing as an alternative for twin-engine operation.

Marion R. Brown, secretary of the

Helicopter Council of Aircraft Industry Inc., reported that the opposition of the Post Office Department in the New York area helicopter case was a serious factor. Opposition was made on grounds of excessive cost, lack of landing facilities adjacent to New York City, Port Jervis, and dispatching without transportation required for other than air mail letters.

Brown and the hearing showed clearly that "twin-engine helicopters will be a significant step forward" in utilization of the helicopter as a passenger transport. The helicopter industry is based on single engine equipment but all parties expressed strong interest in the great potential of twin-engine aircraft, both in safety and in utilization of more convenient operating areas.

High Cost of Reverse Thrust

CAB Safety Bureau chief says ALPA plan would require \$37,120,000 for present tricycle gear planes.

Equipping all existing U.S. scheduled airline transports of the tricycle landing gear type with reverse thrust propellers—as recommended by the Air Line Pilots Assn.—would cost about \$37,120,000, according to John M. Chandler, chairman of the Civil Aeronautics Board's Bureau of Safety Regulation.

► **Chandler's Testimony**—Chandler told the subcommittee to a House Interstate and Foreign Commerce subcommittee in testimony that the ALPA-backed legislation to establish an independent air safety board, ALPA had charged CAB with delay in promoting new safety regulations (see p. 10).

a reverse thrust propeller requirement) and had accused that a number of accidents could have been avoided had proper rules been adopted (Aviation Week May 13).

Only tricycle landing gear type transport currently being flown by U.S. airlines without reverse thrust propellers are Constellation and DC-4s.

► **\$335,000 per L-9**—Chandler said that equipping each model L-9 Constellation with reverse thrust propellers would cost \$335,000 per plane. Last week's could be equipped for considerably less per unit.

In all, about 54 Constellations of various types still lack reverse thrust

propellers. They could be fitted with the new props for about \$15,000,000, the being the direct cost which others will pay. The cost of the new props for the airframe while the props are not at service for modification. In the case of the L-9, that cost-effective period is extended of two years and not just one.

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action concludes with that taken in the domestic or freight forwarder case.

The Board will continue the present ICA convention in providing of the experts services in more offices to the public, including agencies between the U. S., Canada, Cuba and Alaska.

CAA said its intention will be placed on the number of citizens and foreign or freight forwarders to be authorized that a screening process will be used to ensure that only those applicants receive authorizations who are found to meet the requirements of the adopted regulations. "Our experience in the domestic field leads us to believe that only a moderate number of international forwarders will qualify," the Board declared.

It shows Alleged-Morehead, certified citizens, who operate authorization of domestic freight forwarders services, have called on CAA to correct alleged abuses.

American Airlines wants Part 296 of the Federal Regulations amended so that "no freight forwarder may receive a commission from any direct or indirect source for solicitation of traffic payment to its agency agreement or otherwise."

Under the agreement stipulated, if a forwarder gets a commission from the direct carrier and pledges to use his best efforts to solicit and promote movement of freight over that airline.

Deal Rules: The first deal of regulated forwarder and agent of a direct carrier confuses the shipping public over who responsible for a particular shipment and is to specific rules applicable to that shipment. As declared, the practice renders inaccurate the information of a published tariff and constitutes a rebate to the forwarder in violation of the Civil Aeronautics Act.

"If the practice continues," Airlines declared, "other direct carriers may be compelled for competitive reasons to enter into similar arrangements with other forwarders so that each carrier will have its own forwarder in its agent."

Midway Being Closed

Air Coordinating Committee has approved plans to discontinue all Civil Aeronautics Administration facilities at Midway Island effective May 1.

The decision to discontinue the CAA facilities including a communications system, radio range and beacon facilities, followed an earlier announcement by the Navy that it was withdrawing from the island. The Navy had supplied various maintenance, search and rescue facilities, communications facilities and general support for the island.

Relinquished post to CAA of outstanding facilities without Navy assistance is \$600,000 annually, with an

added expenditure of \$995,000 to modify the facilities to meet civil needs. Under the schedule an air carrier landings with plus adequate additional landings by other civil planes, have been made at Midway. These will be the future beyond Midway and the facilities on Wake Island, which will remain in operation.

Trans-Canada Starts Montreal-N.Y. Run

Trans-Canada Air Lines has received its long-awaited license for service permit to operate between Montreal and New York, and service began last week.

The authorization was tied up in the courts for about six months when Canadian Airlines lost its case and alleged the validity of the U. S. Canada air transport agreement of June, 1949 which opened the way for joint TCA-a competitor. Montreal New York route. Canadian Airlines had two months ago (Anastasia Worn, Feb. 13) although it still contends the new Trans-Canada competition will be damaging.

White House Approval—In making the permit with White House approval, the Civil Aeronautics Board declared that the U. S. "cannot expect Canada to permit our airlines to serve that country unless we accord similar rights to Canadian carriers." The Board indicated that Canada's net savings would not suffer from the new competition since and can be awarded to meet the company's increased requirements.

TCA hopes to inaugurate Montreal New York service this month using four-engine, 40 passenger Canadian DC-4B aircraft for three roundtrips daily.

SHORTLINES

► Aero-Transportes, S. A.—The Mexico carrier has been adding operations on small four-engine aircraft of 8 to 10 passenger capacity. Company is based in Mexico City.

► Air France—This firm representing with France-class air service on some of its routes from Paris to Asian ports. Four-engine brand is with four-engine DC-4B, while tourist class DC-4B has 33 passengers and have a 15 percent fare reduction.

► Air Transport Assn.—The expressed dissatisfaction over its 19 percent fare discount agreement with the travel services. ATA says that despite the past suggested last year, neither transportation officers are showing considerable sympathy in thinking of various rules, traffic will cannot be raised by air

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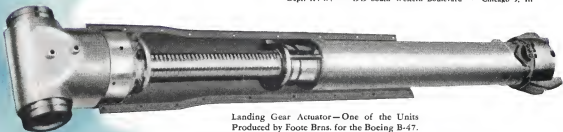
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